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Introduction

Stephen Pryke

1.1 Supply Chain Management – What Is It?

Any discussion of construction supply chain management (SCM) is usually informed by a wide range of definitions. This diversity of definitions and understanding presents a challenge, which this book addresses. We explore a wide range of conceptual issues that help us to understand the nature of supply chains in construction. In addition, there is case-study material reflecting the work of some of the leading proponents of SCM in UK construction. The premise for this book is the move from the *project* and its management, as the main focus for the management of the construction process, towards the *supply chain* and its management as the main focus. The supply chain is the focus for more effective ways of creating value for clients; as a vehicle for innovation and continuous improvement, integration of systems and perhaps even improved, industry-wide, profitability levels.

Value creation is increasingly viewed as a process facilitated through a supply chain – a network of relationships within which firms are positioned. New and Westbrook (2004) suggest that firms in supply chains must build networks so as to provide complementariness between inner and external abilities, that is to say, effective supply chains need to be supported in networks that extend beyond the immediate linkages of exchange in order to create the value in each link. In the same way that individuals are drawn to, or naturally seek, other individuals with skills, knowledge and attributes that they themselves lack, firms are drawn to form collaborative relationships with other firms with skills, knowledge, attributes and perhaps resources that are complementary to the first firm. Just as individuals in society find it difficult to survive isolated from others, isolates in business are vulnerable and may fail in time unless they possess a unique skill or talent which gives them market power (for example a monopoly supplier or oligopoly of few suppliers in a market of buoyant demand).

The term *supply chain* implies a linear process. This linearity, however, exists only at a high level of abstraction. At an applied level, when we

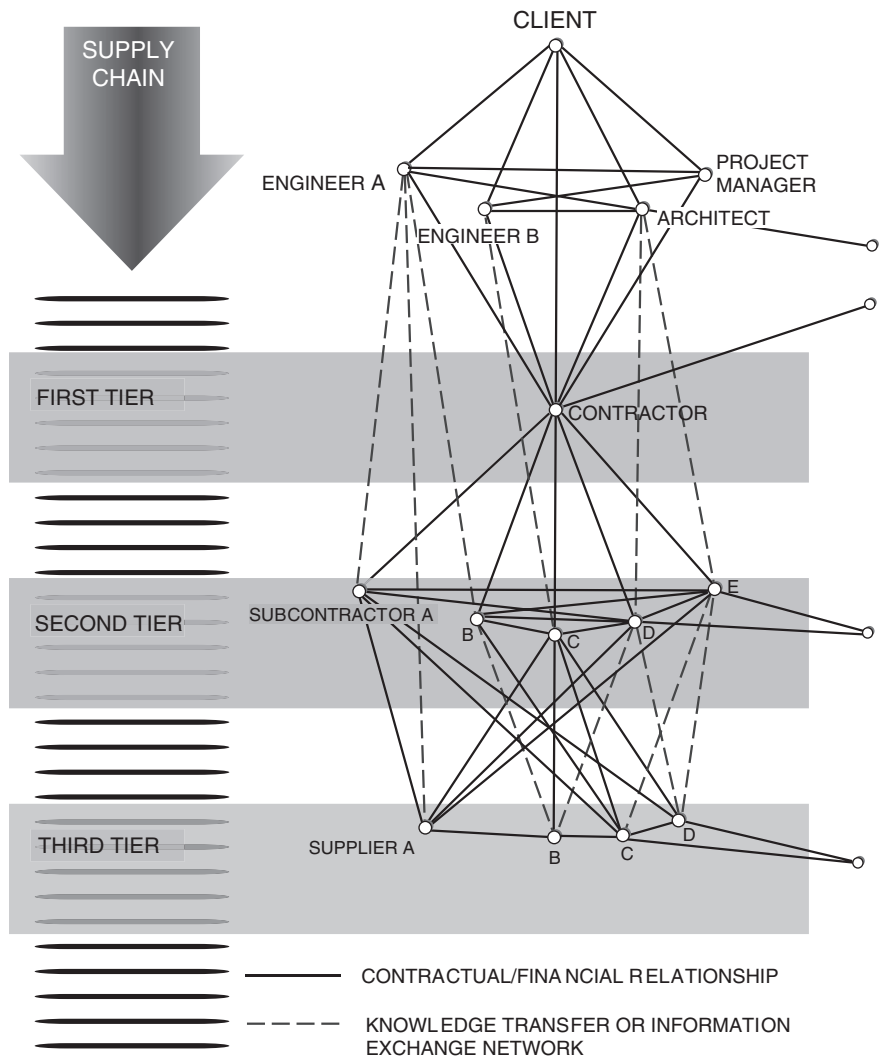


Figure 1.1 Supply chains and networks.

explore the nature and operation of supply management, there is limited linearity, clusters of suppliers coming together in series of dyadic exchanges. Social and market exchanges create social and technical systems which, once in place, are observed as dynamic networks of relationships. The juxtaposition of these two aspects of supply chains is shown in Figure 1.1.

In construction we observe clients, consultants, contractors and suppliers in the broadest sense positioned as *nodes* connected by linkages comprising knowledge transfer, information exchange, directions and financial and contractual relationships. These networks are transitory (Pryke and Smyth, 2006) and the flows are iterative (Pryke, 2001); like neural networks the *nodes* are continually linking and disconnecting depending on the project function to be performed. Each linkage involves flows that produce a

response and generate a succession of dyadic or multi-directional flows until a particular function is satisfied and specific issues are resolved.

During the early stages of post-Latham (1994) reform in UK construction, major clients were working hard to find better ways to procure and manage construction services. Partnering had real application for the large, experienced clients that had the resources to experiment with innovative systems. British Airports Authority and Slough Estates plc provided corporate and developer client examples of what the industry was striving for during the mid-1990s. The large number of arguments in support of less adversarial relations and partnering arrangements in supply chains have been advocated post-Latham and post-Egan (DETR, 1998), particularly for the large client. And yet the down side of partnering can potentially be a recipe for complacency on the part of service providers (which might include consultants, contractors, subcontractors and material and component suppliers); and higher outturn costs for clients. Large clients were not slow to realise the vulnerable position that they individually and their organisations found themselves in as a result of abandoning the ‘comfort zone’ of traditional competitive price bidding on a contract-by-contract basis.

BAA and Slough Estates, among others, started to think about the solution to maintaining value for money and ensuring continuous improvement in the services that both organisations procured in great quantity each year. Bedtime reading for ambitious young executives at BAA during the mid-1990s was *The Machine that Changed the World* (Womack *et al.*, 1990). This seminal work did not deal with construction at all – it referred to a post-mass-production motor manufacturing industry and embraced and expounded lean thinking. The existence of long-term supplier relationships and the relatively intense management of these relationships were central. Major construction clients began to realise that partnering provided a threat and an opportunity – the threat of escalating costs and poor performance from service providers, but the opportunity to collaborate and integrate within the context of long-term relationships. The construction design and production process has some activities that non-construction manufacturers would recognise immediately – standard and semi-standard components incorporated into a system to provide for example heating, ventilation, lift installations or perhaps suspended ceilings; these components are delivered to site and fixed together to form a system or sub-system within the building. The management of the design and supply of standard and semi-standard components, assembled at the final assembly place (in our case, the site) enables the principles found in manufacturing to be fairly simply applied to these parts of the construction scheme. Yet the construction team has to deal with an additional, slightly less ordered type of process, which might be referred to as *site crafted work*. Figure 1.2 illustrates this point through an adaptation of Harland’s (1996) work.

A slightly uneasy relationship has developed between construction project management and SCM. Indeed, senior staff at BAA during the mid-1990s insisted that project management as a discipline was ‘dead’ and that all future reference would be to SCM. The problem remained, and still persists, of how the site-crafted element of new buildings is managed – SCM in its

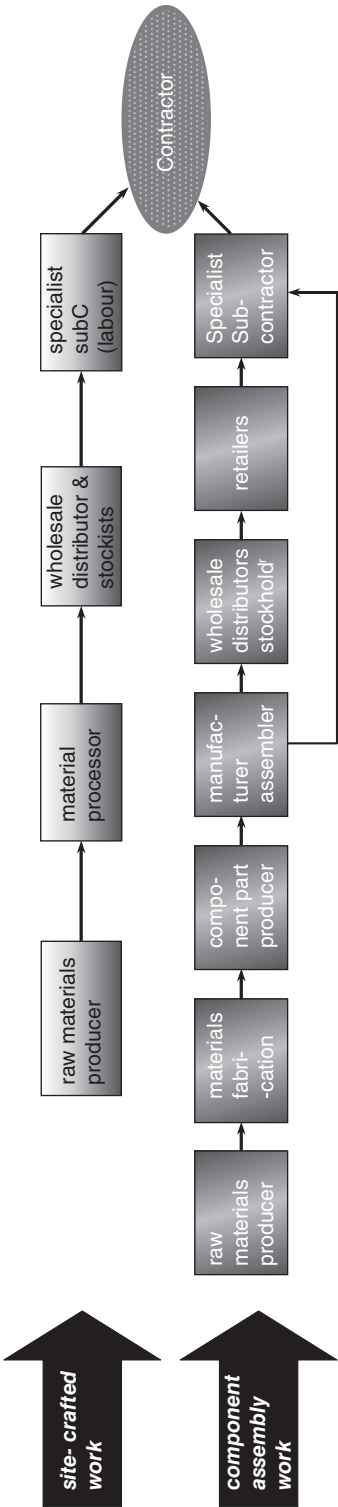


Figure 1.2 An inter-business construction project supply chain. source: adapted from Harland (1996: s67), cited in Pryke (2001).

purest form does not really help us to procure and organise brickwork and plastering, for example, the so-called ‘wet trades’. Observers (Green, 2006, for example) might dismiss SCM as the current fad or fashion. Yet, casual enquiry with many construction firms confirms a commitment to SCM. But so often organisations have simply changed the titles given to their procurement staff using the words ‘supply chain managers’. SCM involves intensive management activity from a central position within the construction coalition or network either by the client organisation, or by another organisation acting as the client’s agent. The time consuming and demanding activities comprising effective supply chain management in construction involve everything ‘from the quarry to the finished project’. It requires capacity and knowledge at the centre and a certain commitment from client organisations to make it effective. Recent research (unpublished as this book went to press) carried out at UCL and involving a number of major UK construction client organisations, indicated that the examination of sub-supply chain elements to investigate the incremental accumulation of both cost and value proved extremely instructive. Identifying and mapping small sections of the overall supply chain for a construction project and isolating the costs and value added by each actor’s involvement provides the basis for a more enlightened understanding of cost and value in construction projects.

The aim of this book is to demonstrate that SCM in construction is more than a management fad and provides the opportunity for substantial improvements in client and stakeholder value and/or reductions in overall costs. The book brings together the conceptual ideas of some of the best thinkers in academia, with the first-hand experiences of a number of practitioners in construction. It is offered in response to a number of enquiries from academics, students and practitioners about the nature of SCM in construction.

The book is intended to stimulate debate around the subject of SCM in construction, whether the reader regards SCM as a new way of conceptualising the management of projects or whether SCM is regarded as a new technique to be learned. Either way, the reader might benefit from acquiring an understanding of some of the basics of SCM before turning to the discussion within the material included here. Ayers (2004), Copacino (1997), Dyer (1996) and Ptak and Schragenheim (2000) all provide some introductory basics in a non-construction context. For sources dealing with the implementation of SCM in construction see CBPP (2003), Cain (2003), Cox and Ireland (2002), Holti, *et al.* (2000), London and Kenley (2001) and Virhoef and Koskela (2000). At the same time the Project Management Institute Body of Knowledge (PMI, 2000) provides a context from which to understand the relevance of the debate that follows in the various papers offered here.

1.2 Supply Chain Management and Project Management

Project management has evolved through several stages of development, each adding complementary understanding to the existing bodies of knowledge (Pryke and Smyth, 2006):

- *Traditional* project management approach – techniques and tools for application (for example Turner, 1999; cf. Turner and Müller, 2003; and Koskela, 1992; 2000), which tend to have a production or assembly orientation focused upon efficiency.
- *Functional* management approach – strategic, ‘front-end’ management of projects (Morris, 1994; cf. Morris and Pinto, 2004), for example programme and project strategies, and partnering (Egan, 1998) and supply chain management (see Green and May, 2003) and other task-driven agendas which dovetail with the traditional approach, for example the waste elimination application of lean production (Koskela, 1992; 2000).
- *Information processing* approach – technocratic input–output model of managing projects (Winch, 2002).
- *Relationship* approach – project performance and client satisfaction, achieved through an understanding of the way in which a range of relationships between people, between people and firms, and between firms as project actors operate and can be managed.

Relations are context specific (Pryke and Smyth, 2006). There are different contexts for relationships, which operate at different levels:

- Business-to-business or organisation-to-organisation;
- Organisation-to-individual representing the business: market and other societal relations (see Gummeson, 2001);
- Individual-to-individual: personal and social relations.

Personal relations can be characterised as (Pryke and Smyth, 2006):

- Authority: management and leadership;
- Task related: function and role;
- Acquaintance: social obligation;
- Friendship: social bonding and reciprocation;
- Sense of identity: who you are (not what you do), such as inheritance and societal recognition – through ownership in business for example.

Organisational relations can be characterised as:

- Individual or personal: the individual represents the organisation;
- Systematic or procedural: personal relations have been enshrined into an approach or systematic way of proceeding in order that the essence of a relationship is replicated at a general level in the future through social or legal obligation (cf. Wenger, 1998);
- Strategies and culture help guide the context in which systems operate, guiding the thinking and behaviour of individuals in order that relations through individuals and systems are aligned;
- Structure of an organisation both reflects relations and governs relations through hierarchy, function and proximity.

The quality of relationships is a key element in the success of a project. The quality may be the product of a range of factors and therefore a consequence of a whole series of dynamic issues. In this way a project team is merely the recipient of those relationships and how they develop both within

the project team and with those who are externally feeding into the project. However, relationships are also *managed*. This book is devoted to the management of relationships through the framework of supply chains. The study of projects and their supply chains provides an appropriate context for the analysis of construction projects and programmes within a partnering framework.

1.3 Origins of SCM in Construction

The aim of this section is to review the historical context and nature of SCM in the UK construction industry. SCM is inextricably linked with partnering but whether partnering creates the need for SCM or vice versa is a debatable point. It is clear, however, that the discussion of SCM needs to be preceded by a definition of partnering. As the aim of this book is to deal primarily with SCM, the discussion of partnering is deliberately brief.

1.3.1 A brief history of partnering in construction

'Partnering involves two or more organisations working together to improve performance through agreeing mutual objectives, devising a way of resolving any disputes and committing themselves to continuous improvements, measuring progress and sharing gains' Egan (DETR, 1998, page 9)

Bovis (now Bovis Lend Lease) is credited as being the first UK construction organisation to be involved in a partnering arrangement (Loraine, 1994). The other partner was Marks and Spencer, the retailer, and the arrangement was not called partnering at the time. Given the repetitive nature of *internal fit-outs*, with standardised fittings and finishes, this would have been a situation where Banwell's (Ministry of Public Building and Works 1964) *serial contracting* could have been usefully applied. Loraine (1994), on the other hand, suggests that modern partnering has its origins in the Japanese motor manufacturing of the 1960s and 1970s. The US construction industry began to use partnering in the 1980s, commencing with Shell Oil and Parsons SIP in 1984. The characteristics of these partnering arrangements appear to have been long term relationships between manufacturers and key suppliers, and often included maintenance as well as initial installation (similar in concept to the operation of the lift installation sector of the UK construction industry).

The process of selecting a contractor on the basis of lowest competitive tender is at the heart of what Winch (2000) describes as the *professional system*. Winch identifies the way that activities facing the highest uncertainty in the design stages are insulated from the market by the employment of a consultant, reimbursed on a (non-performance related) fee basis. The industry has seen the evolution of *control actors* (quantity surveyors and clerks

of works principally) whose role it was to regulate the activities that remained subject to market forces (Winch, 2000).

Despite some moves towards reform, (notably Design and Build, and management contracting) the industry developed during the latter part of the twentieth century into a low-trust system, in which consultants spent too much of their time ensuring that their professional indemnity insurance cover was not exposed to unnecessary risk, and contractors and their sub-contractors adopted opportunistic behaviour as a means of recovering from unacceptably low tendered profit margins in a context of inappropriately allocated project risks. The industry did not necessarily perceive the context and systems prevailing within UK construction during this period as a problem (Pryke, 2001). Both the Latham and Egan Reports referred to the importance of partnering in reforming the construction industry. The CRINE project in the North Sea (<http://www.crine-network.com/>, cited in Winch 2000) demonstrated the benefits of partnering in the offshore gas and oil industries, which were related to the mainstream construction industry. The motivation for the introduction of partnering, in this case, was related to the need to drive down costs in order to exploit resources that would otherwise have been unprofitable. The partnering initiative was seen as a vehicle for intensive financial management of the supply chain.

Other, relatively early, examples of UK construction partnering include an example given by Daniels (1991, cited in Betts and Wood Harper, 1994) where a UK brick supplier re-engineered its links with architectural buyers through innovative use of IT. The broad principles of trust and maximisation of each participant's resources and expertise have become the main focus of partnering agreements used within the industry. The Latham Report expressed some concern about the possibility of 'cosy relationships' and offered trust and openness, along with 'mutually agreed and measurable targets for productivity' as possible antidotes to the opportunism with which the industry had become all too familiar (Latham 1994).

Barlow *et al.* (1997) suggest that there are three main perspectives on partnering:

- A construction process, performance-enhancing tool which draws upon synergy and the maximisation of the effectiveness of each participant's resources (Barlow *et al.*, 1997).
- A management process involving strategic planning to improve efficiency in large projects, or perhaps a variant of total quality management. Others have emphasised the *common goals* aspect and partnering as an aid to *collaboration*.
- The *non-contractual governance of construction projects school*: Barlow *et al.*, (1997) referred to 'putting the handshake back into doing business' implying a move towards trust and informal arrangements (or what is referred to as 'keeping the contract in the drawer').

The unique division of labour operating in the construction industry involving designers, contractors and materials suppliers has been cited as a central theme and a focus for reform (see Higgin and Jessop, 1965;

Cherns and Bryant, 1984; and Bresnen, 1997, for example). The construction project coalition is a temporary coalition of firms (see Winch, 1989 and 2000). Each firm represents a discrete (contractually defined) role, and when these roles work together, we hope that partnering will modify the roles and the relationships between them. We might, therefore, regard the construction project as a *role system* (Simon, 1976). A number of the perceived benefits from partnering arise from the ability of this system of roles to improve organisational learning.

Partnering is seen by some as a means of removing these artificial divisions, yet the evidence of the effects on actor roles and relationships is difficult to locate (Bresnen, 2000). There are also varying views about the precise role that contracts and charters play in partnering. One group (notably Quick, 1994; ACTIVE, 1996; Green and McDermott, 1996; cited in Bresnen, 2000) asserts that partnering agreements prevail over the building contract conditions, because of the improved understanding arising out of cross-disciplinary communications. Others (notably Loraine, 1994, referred to above and Roe, 1996, cited in Bresnen, 2000) regard contractual forms of governance as an essential safety net in the event that partnering might fail.

The move towards informality in the governance of construction projects – the move away from *contract management* towards *relationship management*, has brought with it a demand for methods of effectively managing these new types of linkages between project actors. One of these initiatives was supply chain management.

1.3.2 Supply chain management

The aim of this section is to introduce the concept of supply chain management (SCM), establish some definitions and look at the history. SCM in construction is arguably a more recent innovation than partnering. Whilst the Latham Report was unequivocal in its recommendation to the industry to adopt ‘partnering’ (Latham, 1994, discussed above), the thoughts of the authors were slightly less well developed in relation to SCM. The report contains a reference to a presentation by Dr Bernard Rimmer of Slough Estates plc at a conference organised by ‘Contract Journal’ and CASEC in December 1993, where the position of the client in relation to the motor-manufacturing industry and the construction industry are compared (Latham, 1994).

The Egan report (DETR, 1998) was quite specific in its reference to SCM. The report recommends the adoption of the following features of SCM:

- Acquisition of new suppliers through *value* based sourcing;
- Organisation and management of the supply chain to maximise innovation, learning and efficiency;
- Supplier development and measurement of suppliers’ performance;
- Management of workload to match capacity and incentivisation of suppliers to improve performance;
- Capture of suppliers’ innovations in components and systems.

1.3.3 Some definitions of supply chain management

Partnering in its most simple form asks little more of the project actors other than co-operation. Arguably, the industry should be encouraged to abandon the futile pursuit of adversarial and non-collaborative relationships within the context of a system that will never deliver the *customer delight* to which the construction industry's clients aspire and are so often frustrated in achieving.

Howell *et al.* (1996) argue that partnering should be used to facilitate major process re-engineering rather than easing the difficulties encountered in inappropriate systems for the procurement of construction work. This realignment should focus upon the needs of a *concurrent design and production process*.

In order to achieve an output, this re-engineered process must include the management of the various actors in the product supply chain. Views differ as to the nature of this supply chain and it is arguable whether a complex network of organisations working together in a number of non-trade related clusters, are best described as *chains* and this was referred to at the beginning of this chapter. Figure 1.2 illustrates the relationship between the supply chain and the network of relationships overlaying it. The term supply chain management tends to be used to refer to management processes as well as structures of organisations.

Harland (1996) classifies SCM into four categories of use:

- *Internal Supply Chain* – this view of SCM owes a great deal to the work of Porter, (1985) on value chains and is concerned with an intra-firm approach to supply chains that involves the management of materials.
- *Dyadic relationships with immediate suppliers*.
- *The management of a chain of businesses with which you have no direct contractual relationship* (suppliers' suppliers and a customer's customer, for example).
- *The management of a network of interconnected businesses involved in the ultimate provision of a product ... (to) end customers* (Harland, 1996).

Cox and Townsend (1998) cite the activities of Gazeley Properties Ltd as a good example of partnering and SCM. Gazeley, we are informed, '... attempts to manage the development supply chain in such a way as to maximise its margin while satisfying its clients' aspirations in terms of utility and cost'. If we replace the words *development supply chain* with *project*, we have a description of what all developers must be doing to remain competitive and satisfy their clients. It is, however, recognised that there is an implication that by using SCM on a construction project we are doing something more complex than managing a group of subcontractors and suppliers.

The relevance of SCM to construction (Pryke, 2001) lies not in the *existence* of supply chains, but in their *exploitation*. The management of a supply chain by a developer or contractor, implies the management of actors far removed from the dyadic contractual relationships inherent in construction contracts. Traditional (pre PPC 2000) forms of contract

are based on the premise that, as an actor, one is in a relationship with another actor that instructs, pays, has control of a range of performance incentives and therefore manages ones activities. Each actor therefore is managed by the actor above in the supply chain, and in turn manages the actor or tier of actors below. Exploiting the supply chain involves communication with other actors that have been artificially separated from us by inhibiting contractual conditions. This leads us towards the concept of centrality and SCM. In order to successfully manage any supply chain we need a single actor with the authority to deal with all actors within the supply chain.

Cox and Townsend (1998) distinguish the system used by Gazeley Properties (using SCM) and those used by other, more traditional approaches, in the following terms:

- Separation of roles between end-user and fund provider and balancing the needs of these two actors;
- Use of project managers as interface with consultants and contractors;
- Concept design carried out in close consultation with end-users;
- Detailed design *may* involve input from key suppliers;
- Early participation of main contractors in design.

If we paraphrase slightly Christopher's definition (see above) we have:

The management of . . . relationships with suppliers . . . and customer to achieve greater customer value at less cost.

It is argued that this management process becomes supply chain management when it is carried out within a partnering context.

Stevens (1989), offers us a model of the transition of the firm from *stand-alone* organisation to *supply chain partners*. The four stages are as follows:

- *Baseline organisation* – classical management; motivation by profit maximisation; functional specialisation; slow to adapt to market and slow to exploit innovative opportunities.
- *Functionally integrated company* – starting to focus on customer service; competitive advantage achieved through some internal integration of disparate functions.
- *Internally integrated company* – systems approach to customer service; optimal information flow between departments; medium-term planning; cross-functional management – product focused structure.
- *Externally integrated company* – transparent system of materials and information exchange internally and externally; long-term planning and long-term relationships with partners; use of internal cross-functional management structures, product related; supplier networking groups implemented (Stevens, 1989).

Much of the literature dealing with the subject of SCM, including Stevens (1989), is not related to construction. Relating the four categories of transition to the current construction industry is disconcerting. It is argued that

the vast majority of the industry falls firmly into the *baseline* category. Even those construction organisations where SCM is firmly on the agenda, show only very limited integration of disparate internal functions. In particular, cross-functional management within the organisation and the use of supplier networking groups, are particularly difficult to observe.

1.3.4 'Bottom-up' design

One of the most important changes that the construction industry must deal with in its evolution into SCM organisations is the recognition of the most appropriate location of specialist knowledge in a number of fields. Applying the principles of lean production to construction must move the location of the leadership in design from the relevant consultant to the most appropriate subcontractor, supplier or group of same. The CRINE report (<http://www.crine-network.com/>) borne out of the need of the North Sea Oil industry to drastically reduce its costs in the face of plummeting world oil prices, identified some important principles, which many have sought to apply to the UK construction industry. These principles were, in summary:

- Use of performance specifications to communicate interpretation of client's brief by consultant to subcontractor or supplier;
- Standard forms of contract to emphasise mutuality rather than adversarial positions;
- Use of incentives to deal more fairly with risk allocation within these non-adversarial alliances;
- Simplification of the tendering protocol and the documentation with which it is associated.

SCM articulates a process of design and financial management, the need for which must always have been present. But management of any process or system requires some focal point from which the manager can operate. The division of labour within the construction industry has meant previously that management of the whole process has been fragmented. Design, site production and component manufacture have each been managed separately. The management of these sectors have been poorly coordinated and this is partly because the conditions of contract have traditionally distinguished and separated these sectors. This tends to point to a growing need for one actor to manage the whole design/site production/component manufacture process. In terms of capacity and authority, this actor would need to be either the client or the contractor.

SCM introduces a fundamental shift in focus of responsibility and authority within the overall network of project roles. This system of evolving project roles sits within a context of competing and perhaps conflicting governance patterns. A dynamic exists between formal, contractual relationships (which initially define roles and relationships) and the less structured and formalised project management policies, such as partnering and work clusters (which both ultimately shape project roles and the way in which they are connected). These managerial approaches have a fundamental

affect on actor roles and the nature and patterns of interactions between these roles.

There is a plethora of material exploring the importance and application of project management to construction projects. Increasingly, there is emphasis upon managing *programmes* of projects. Perhaps the emphasis must now change from the management of projects and programmes to the management of standing supply chains. Many would argue that integration of process, innovation and radical change in cost and value are only possible through a focus upon the activities of the supply chain. The contributions to this book have been chosen to provide a theoretical framework and case study material to explore these issues.

1.4 Overview of the Book

The text is presented in two sections; the first (Part A) deals with the establishment of a theoretical framework, which conceptualises SCM. The second part of the book deals with some important examples of the application of SCM in UK construction. Part B moves from the innovative SCM strategies adopted by two of the UK's largest clients through main contractors' issues and, finally, to an innovative approach to SCM that will appeal to the contractor and subcontractor alike.

Morledge *et al.* get things started with their chapter dealing with the concept and development of SCM in construction. The chapter traces the development of SCM in construction from its origins in manufacturing. Reference is made to the importance of both the Latham (1994) and Egan (1998) reports and the need for cultural change within the industry is emphasised; the theme of culture in supply chains is also dealt with later by Richard Fellows. Morledge *et al.* attribute the evolution of SCM to the pressure upon the construction industry for reform and the subsequent search for alternative, perhaps innovative methods and systems. The chapter ultimately questions whether or not it is feasible to implement SCM principles in construction. The transient nature of construction and its teams, especially for the one-off or low volume client, is cited as a factor. The arguments contrast with the discussion of the experiences and attributes of the very large client organisation later in the book.

The reference to culture in supply chains is built upon in a chapter by Richard Fellows. This chapter starts with an introduction to the concept of culture and asks how we fit SCM to culture. Fellows draws conceptually upon the work of Mullins (2002), providing a good fit to project 'atmosphere'. Culture values and ethics are looked at with a team-centred focus and integration is discussed. The importance of power and leverage in supply chains is emphasised. Fellows discusses the concept of cognitive dissonance and one wonders whether this helps to explain why project actors frequently express the view that 'everyone else is out of step'; frustration leading to disillusionment, then concern, followed by opportunistic behaviour. All of this is located within the context of a coalition of project actors, largely governed anonymously, and in a confrontational and formal manner,

through the administration of standard forms of contracts and their written instructions. Perhaps cognitive dissonance also helps to explain why multi-disciplinary teams of actors perform badly and clients are frequently frustrated. Finally, Fellows deals with the potentially contentious (in the context of supply chains) issue of fragmentation. Fragmentation is cited as a problem. This contrasts with the work of Rimmer, where successful SCM can function hand in hand with *increased* fragmentation.

Bresnen continues the theme of culture, albeit in a rather less prominent role. Bresnen deals, in Chapter 4, with learning and innovation through collaborative relationships. After defining SCM, he considers the importance of integration in supply chains and asserts that learning in supply chains is an issue that frequently gets forgotten. Bresnen cites cultural differences as a barrier to learning in supply chains and refers to the frequently cited problem of collaborative relationships rarely cascading below the first tier suppliers in the supply chain. It is proposed that power in supply chains is based upon both leverage and expertise. Bresnen posits that there is a mismatch between systems and routines in project environments and laments the underdeveloped state of supply chain management in construction. This is a theme that Edkins links to in Chapter 9, the final chapter in the first half of the book. The conflict between transactional exchanges and project based supply chains is discussed and the importance of social networks in flows of knowledge and learning identified. Bresnen posits that there is a mismatch between systems and routines in project environments and expresses concern about the underdeveloped state of supply chain management in construction.

Skitmore and Smyth suggest that good practice in SCM should be effective in adding product and service value and this cannot be achieved without addressing marketing and pricing strategies over the long term. There is a call for the reappraisal of the way that SCM is understood. There is some criticism of the essentially deterministic approach to the discussion and analysis of SCM. Whether or not the operation and effectiveness of SCM is really influenced by custom and practice in the construction industry is an interesting point that the reader is left to consider when reading Skitmore and Smyth's chapter. The chapter starts with the recognition that SCM can take a variety of forms and is perceived differently within different industries. Marketing theory is suggested as an alternative to what usually comprises a procurement-driven approach to projects. Pricing theory is discussed and the predominance of the price-dominated marketing mix in construction is questioned. It is suggested that applying SCM within a risk minimisation and transaction context leads to cost cutting or the reduction of added value potential and continuous improvement is jeopardised. Skitmore and Smyth provide a suitably thought provoking end to Part A of the book.

Rimmer's chapter opens the second (applied) part of this book. The author has made a major contribution to the reform of the construction industry over the last two decades. Rimmer provides case study material relating to the organisation that he helped manage and through which he was able to implement many important SCM initiatives. The chapter deals with the important role that the hands-on clients have to play in the

management of the construction supply chain. Uniquely, the importance of SCM during the period over which the client must finance the site purchase and organise design and construction prior to financial payback is highlighted. Rimmer provides an overview of each of the types of procurement and provides a graphical model showing three different types of link between supply chain firms – *direct* (involving payment); *management relationships*; and *design relationships* (both the latter involving formal instructions). Rimmer identifies the problem that prevails in construction whereby the professionals or consultants are typically trusted and the contractors and subcontractors are mistrusted; this is cited as an important barrier to the effective implementation of SCM. The importance of collaborative relationships in construction project teams is emphasised.

Potts takes on the task of documenting and discussing the high profile supply chain managing efforts of British Airports Authority (BAA). He discusses how the client for the Heathrow Express at the time of a highly publicised tunnel collapse during construction, used SCM principles to recover from the disaster and enable the project team to function effectively and complete the project efficiently. The Genesis project provided a pilot study for the techniques and systems proposed in the management of BAA's Terminal 5 at Heathrow. Potts relates the way in which BAA investigated the cause of failure in 'mega-projects' and found that the way in which the supply chain was engaged and risk management systems used were important factors. BAA's development of supply chain strategies and systems evolved through the exploitation of three key initiatives – partnering; innovation and best practice; and the framework agreement programme. The framework agreement programme, BAA's structured partnering arrangement, provided a comprehensive, if somewhat bureaucratic model for others to emulate. Potts cites the main motivations for the SCM initiatives at BAA as Jones *et al.*'s famous (non-construction) book, *The Machine that Changed the World* (1990) and the Egan (1998) report. The chapter finally looks at the detail of BAA Heathrow Terminal 5 (T5): BAA envisaged the virtual firm, where the principles of partnering were applied and developed to their full. The contract documents comprised the T5 Agreement, which in simple terms moved away from the traditional dyadic contract forms epitomised by the Joint Contracts Tribunal (JCT) forms of contract: the documents effectively map the extent of the project network and the nature of the relationships between the various project actors. A number of T5 best practice principles are set out bringing this review of 15 years of BAA's development to a close.

In King and Pitt's chapter we move very firmly from the clients' perspective on SCM over to the main contractor's view. This chapter is a collaborative venture between the academic and the practitioner and essentially deals with Pitt's experience of SCM with Bluestone plc, which was bought out by Morgan Ashurst during the writing of the chapter. The chapter differentiates between organisational and project supply chains and essentially challenges the main premise of the two previous chapters in terms of which project actor is best placed to manage the supply chain. The research on which the chapter was based used an innovative research method – action research;

this research involved five dominant themes comprising relationships, culture, consolidation, consistency and cost. The chapter explores Green's (1999) dismissal of cultural change and challenges his questioning of the transferability of good practice in SCM into construction. The chapter also draws on Cox and Ireland's (2002) important work in the area of leverage in supply chains and the effect and location of power. King and Pitt regret the absence of the equivalent to prime contracting (see Holti *et al.*, 2000) in the private sector and conclude, perhaps uniquely amongst the chapters presented here, that SCM does not find an immediately successful application in construction because the quality of project relationships are of more overwhelming importance, regardless of whether or not SCM principles are implemented.

Power is a theme that Edkins considers. The conflict between transactional exchanges and project-based supply chains is discussed, and the importance of social networks in flows of knowledge and learning identified. Edkins starts this chapter on uncertainty management by considering the totally vertically integrated organisation (like Ford cars in its early days), where much of the final product is created from raw materials by the final assembler of the product. Edkins refers to the related issues of risk transfer and leverage in the supply chain and whether the construction industry should look to contractual remedies or adopt a relationship management approach. The mapping of risk and certainty with benefit and threat are considered. Edkins draws upon some important case study material, including the 1987 Space Shuttle Challenger disaster. The place that is occupied by construction alongside other types of project-based industry is discussed. The role that contracts have to play in the establishment of expectations, roles, responsibilities, incentives and penalties is covered and the chapter concludes with the proposition that risk is allocated to the firm in the supply chain which has the least leverage and is the least able to defend itself.

Smyth's chapter on franchising in construction finishes Part B. This thought provoking chapter leaves the reader wondering whether the concept of franchising is an application of SCM or simply *an alternative* means to structure and control supply chains. Smyth identifies one of the perennial problems facing the construction project manager of trying to control a number of organisations that are not owned by their firm. Smyth identifies a model for franchising in construction that involves the use of standard products and processes, centrally provided marketing and advertising; and some investment by the franchisee. The franchiser provides a brand, quality control, codes of behaviour and some of the administrative support needed to gain workload. The franchisee, whether a large subcontractor or a smaller firm, gains the benefits of being associated with and within a large branded operation but retains control of the franchised business unit and gains through knowledge transfer. Smyth identified two classifications of franchising: management franchising and 'man and van' franchising, the latter as a group gaining more from franchising than the former. Franchising is put forward as an alternative to centralised SCM in construction, based upon the premise that there are similar benefits to the project that franchising can achieve. Importantly, franchising also has the benefit of reaching the lower

tiers of the supply chain, and finally that franchising has the potential to lift the image of construction through a renewed focus on customer care, brand image and the uniform service.

1.5 Summary

This first chapter began with the proposition that the term SCM is, perhaps, inaccurate. It was argued that SCM exists at a high level of abstraction and to observe the operation of the supply chain we might want to explore the network of relationships that comprise the supply chain. None the less, the terms supply chain and supply chain management are in common use and provide the key terms for this text. The motivations behind the pursuit of SCM and the context in which SCM evolved are explored.

An overview of the chapters in the book was provided and the clear definition between the conceptual material of Part A and the applied and case-study material of Part B is made. There is a brief summary of the historical development of both partnering and SCM to provide a context for the discussion which follows.

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